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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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EXAMINER

GROSS, KENNETH A

ART UNIT PAPER NUMBER

2122

DATE MAILED: 02/04/2003

13

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/552,292

Applicant(s)

ROBISON, ARCH D.

Examiner

Kenneth A Gross

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

**DETAILED ACTION**

***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-5 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically in Claim 1, in step (C), it is unclear from the claim language how exactly state components are 'set' at each program point. The 'placing said operations' in step (D) is unclear. It is not clear from the claim language where the operations are placed. The term 'in a way' is unclear. The applicant must specifically detail the way in which operations are placed to remove partial redundancy. Specifically in Claims 4 and 5, the term 'exceptional situation' is unclear as it is not known from the claim language exactly what an exceptional situation is. Claims 2 and 3 are rejected for being dependent on a rejected claim.

Claim 6 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 6 teaches a method step that occurs outside of the scope of its parent claim. It is further unclear from Claim 6 when or how exactly the exceptional paths are removed from the tree.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over “How Debuggers Work”, Jonathan B. Rosenberg, 1996 (hereinafter Rosenberg) in view of McKinsey et al. (U.S. Patent Number 6,446,258).

In regard to Claim 1, Rosenberg teaches the well-known concept of the ‘program stack’, which keeps track of addresses and local variables. Rosenberg teaches: (A) as the program is executing, the state of the stack is analyzed by ‘unwinding’ the stack at breakpoints to find the current state of the stack (page 136, lines 26-32); (B) partitioning the stack at each point into records or ‘frames’ that can be set separately (page 136, lines 25-26); (C) Rosenberg teaches storing addresses and variables on the stack, which is done with a push or similar command for storing information onto a stack (page 137, lines 28-32). These ‘push’ commands sets a component, or frame, of the stack by pushing information (such as addresses and variables) onto the stack, updating the state of the stack. Rosenberg does not teach eliminating partial redundancy by placing the operations stated in step (C) into the code. McKinsey, however, does teach removing partial redundancy by rearranging code (Abstract, lines 1-7). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to analyze the state of a data structure at different program points, where the structure state is broken up into

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components and set, as taught by Rosenberg, and then placing the set instructions in the code so as to eliminate partial redundancy, as taught by McKinsey, since this would allow for a more optimized program overall.

In regard to Claim 2, the examiner takes official notice that the stack data structure, as described by Rosenberg above, stores items on a first-in last-out basis, since this is the nature of a stack.

5. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over “How Debuggers Work”, Jonathan B. Rosenberg, 1996 (hereinafter Rosenberg) in view of McKinsey et al. (U.S. Patent Number 6,446,258) and further in view of Gordon et al. (U.S. Patent Number 6,507,805).

In regard to Claim 3, Rosenberg and McKinsey teach the device of Claim 2, but do not teach representing the stack as a tree of nodes. Gordon however, teaches a call stack tree (Column 18, lines 25-27), where each path traverses the tree towards the root (Fig 14, item 1358) and each node represents a component of the state (Column 18, lines 25-32). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to analyze the state of a data structure at different program points, where the structure state is broken up into components and set, as taught by Rosenberg, and then placing the set instructions in the code so as to eliminate partial redundancy, as taught by McKinsey, and then representing the state of the data structure as a tree, as taught by Gordon, since this would allow for a more organized method of storing states, and a more efficient method for searching states.

6. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over “How Debuggers Work”, Jonathan B. Rosenberg, 1996 (hereinafter Rosenberg) in view

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of McKinsey et al. (U.S. Patent Number 6,446,258) and further in view of Dunn et al. (U.S. Patent Number 6,247,172).

In regard to Claim 4, Rosenberg and McKinsey teach the device of Claim 2, but do not teach that the data structure represents actions to be taken if an exception occurs. Dunn, however, teaches a stack that contains actions to be taken when an exception occurs (Column 1, lines 66-67 and Column 2, lines 1-8). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to analyze the state of a data structure at different program points, where the structure state is broken up into components and set, as taught by Rosenberg and the structure represents actions to be taken if an exceptional situation arises as taught by Dunn, and then placing the set instructions in the code so as to eliminate partial redundancy, as taught by McKinsey, since this would allow for more efficient error handling in programs.

In regard to Claim 5, Rosenberg teaches storing return addresses and local variables before functions and routines (page 136, 9-13). Since any function or routine is capable of causing an error, any program point selected will be immediately before an instruction that might cause an exceptional situation.

7. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over “How Debuggers Work”, Jonathan B. Rosenberg, 1996 (hereinafter Rosenberg) in view of McKinsey et al. (U.S. Patent Number 6,446,258) and further in view of Dunn et al. (U.S. Patent Number 6,247,172) and Gordon et al. (U.S. Patent Number 6,507,805).

In regard to Claim 6, Dunn teaches restoring the state of the program before an exception occurs (Column 1, lines 66-67 and Column 2, lines 1-8), and Rosenberg teaches ‘unwinding’ the stack at breakpoints to find the current state of the stack (page

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136, lines 26-32). Thus, if the state of the stack after restoring the stack to its pre-exception state is converted into a tree (which is a graph) structure as taught by Gordon, the exceptional path would not exist, since it no longer exists in the stack.

### *Conclusion*

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Choi et al. (U.S. Patent Number 6,487,716) teaches performing instruction reordering for exception optimization, including preserving the state of the program.

McKeen et al. (U.S. Patent Number 5,421,022) teaches a method of grouping a program into sets, and reordering the sets to resolve errors.

Fuh et al. (U.S. Patent Number 6,324,683) teaches data structures containing the state of a program. (Column 54, lines 53-64)

The following art teaches partial redundancy elimination:

Lo et al. (U.S. Patent Number 6,151,706)

Chow et al. (U.S. Patent Number 6,301,704)

Callahan, II et al. (U.S. Patent Number 6,415,433)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kenneth A Gross whose telephone number is (703) 305-0542. The examiner can normally be reached on Mon-Fri 7:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory A Morse can be reached on (703) 308-4789. The fax phone numbers

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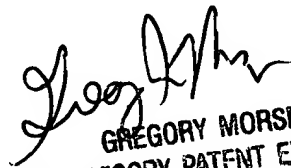
for the organization where this application or proceeding is assigned are (703) 746-7239

for regular communications and (703) 746-7240 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

KAG

January 21, 2003

  
GREGORY MORSE  
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